NWT
Biomass Energy Strategy

Northwest Territories Environment and Natural Resources

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Minister Message

The Northwest Territories (NWT) Biomass Strategy promotes the use of biomass energy in the NWT while ensuring the local harvest of wood remains sustainable.

An increased use of wood and wood pellets as an alternative source of energy supports the Government of the Northwest Territories' (GNWT) goal of an environment that will sustain present and future generations, and sustainable, vibrant, safe communities. The GNWT continues to work very closely with NWT communities in both the implementation and planning of its biomass initiatives.

For centuries, the people of the NWT have relied on wood to heat their homes. As communities grew and fossil fuels replaced wood as the main source of energy, burning wood as a fuel source decreased. Recent rises in the cost of energy and concerns about climate change have lead to a renewed interest in the use of wood and wood pellets to heat northern homes and businesses.

Climate change remains a serious issue for the people of the NWT. It is important to reduce our greenhouse gas emissions and promote alternative, reliable sources of fuel. The GNWT continues to support, investigate and implement initiatives that will assist in adapting to and mitigating the impacts of climate change in the NWT.

The GNWT continues to build on its efforts to reduce greenhouse gas emissions by advancing alternate energy sources such as biomass.

It is my hope this Biomass Strategy will aid us in our attempt to reduce greenhouse gases and set an example for Northerners and the rest of Canada.

J. Michael Miltenberger
Minister of Environment and Natural Resources

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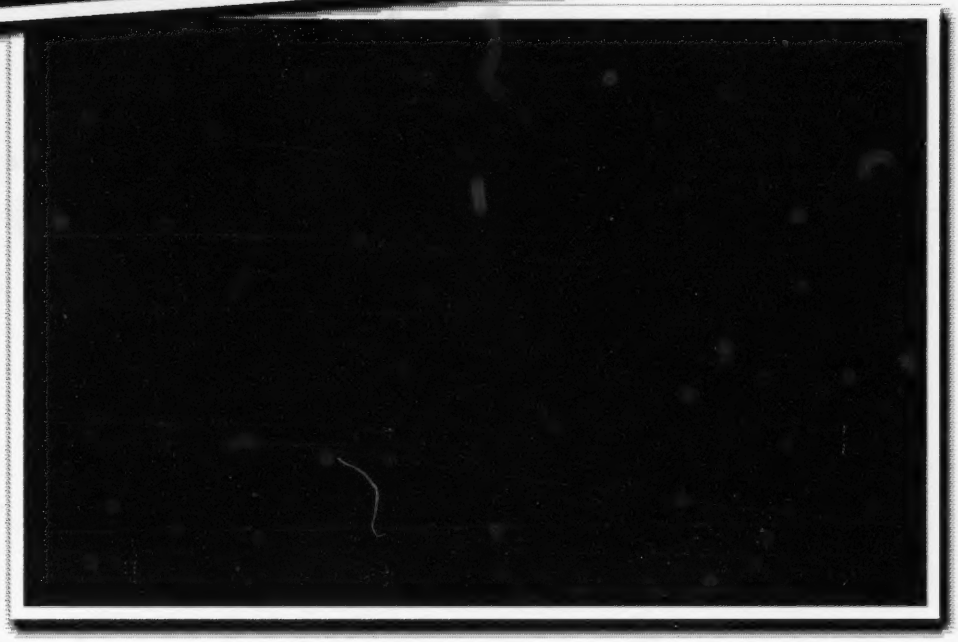
Ashley St. Germaine (left photo)



Introduction to Biomass Energy

Historically, firewood was one of the primary energy sources throughout the Northwest Territories (NWT). Fossil fuels eventually replaced wood as a source of heat in past decades, but wood and wood pellets have received renewed interest in the last few years.

Rising prices for conventional fossil fuels, along with efforts to reduce greenhouse gas emissions that cause climate change, are the main reasons why wood is now being reconsidered as a source of energy. The development of new and efficient technologies has made wood a reliable source of energy for large scale applications. Large wood pellet boilers can heat institutional buildings such as schools and offices, these types of boilers can also fuel district heating systems and generate electricity.

Challenges in expanding the use of wood and wood pellets for an energy source in the NWT exist; firewood for conventional woodstoves is harvested in many NWT communities, but wood pellets are currently being purchased from northern Alberta. It may be possible to develop a new industry in the NWT to harvest and produce wood pellets.

Increased use of wood as an energy source will require careful management of the forest to ensure the harvest is sustainable and carbon neutral.

Transportation and distribution systems for wood pellets and conventional firewood are still not well developed. This leads to high prices in many communities and vulnerability to supply chain interruptions.

The NWT Biomass Energy Strategy is intended to build on the momentum towards greater use of wood and wood pellets by helping to establish conditions in NWT communities for local harvest, improved transportation and production of clean and efficient heat. Larger boilers, possibly servicing loads on district heating systems, will be selected for pilot projects that use biomass to generate electricity.

Biomass. Plant material available on a renewable basis.

Biomass Energy. All forms of renewable energy derived directly or indirectly from organic plant materials produced by the process of photosynthesis.

Biofuel. Solid, liquid or gas fuel derived from biomass.

NWT Biomass Potential

Forest covers 33.3 million hectares of land in the NWT and represents 28 per cent of the Canadian boreal forest. Trees in the NWT grow more slowly than in southern jurisdictions. But with careful planning, NWT forests have potential for the sustainable harvest of biomass energy because the forest industry currently operates at very low levels.

The Department of Environment and Natural Resources (ENR) has done considerable work in mapping the NWT's forests and exploring possibilities for sustainable forestry use near communities.

The most productive forest is concentrated in southern NWT. Broad areas of harvestable forest-land can be found throughout the Mackenzie Valley and the North Slave and Tłı̨chǫ regions.

The absence of major forestry activities provides the NWT with a unique challenge to support biomass energy. Southern biomass energy projects have focused on the use of large volumes of waste wood available from the forestry industry at extremely low cost to produce wood pellets. The NWT does not have a low cost supply of waste wood and must pursue a different course. This means harvesting trees to produce pellets.

Biomass and Climate Change

Biomass is essentially solar energy stored in the mass of trees and plants. When a tree is harvested and burned as biomass energy, it is considered carbon neutral as long as another tree grows in its place. This natural cycle leads to no net gain in greenhouse gases in the atmosphere.

Biomass is also available in the NWT from the following sources:

- Wood residue in the form of woodchips from:
  - road building and maintenance;
  - forest thinning for community protection;
  - forest fire burn areas; and/or
  - pipeline or seismic line cutting.
- Cardboard, paper or construction and demolition waste
- Fast growing willow or poplar

Purpose

The Biomass Energy Strategy guides the Government of the Northwest Territories' (GNWT) actions to reduce the emissions and costs of fossil fuels by promoting the use of wood for energy in the NWT.

The GNWT is responsible for coordinating the actions described in this Strategy and working with communities, businesses and consumers to encourage the use of new technologies for wood energy.

Actions in this Strategy are consistent with the broader goals of the NWT Energy Plan and Greenhouse Gas Strategy including the development of other clean energy sources, energy efficiency and broader energy supply questions.

Goal

The Biomass Energy Strategy establishes conditions to enable biomass energy to become an integral part of the energy mix in the NWT. The Strategy can lead to actions which may increase the consumption of biomass products in NWT communities and reduce dependency on diesel fuel. An efficient biomass energy system can reduce energy costs for residents, businesses and government operations. These systems will vary between communities, depending on factors relevant to each community or region.

Photo Credit: Ashley St. Germaine

Objectives

This Biomass Energy Strategy is an ambitious plan to promote the use of local and imported biomass products. The GNWT, working cooperatively with communities, will: assess the technical feasibility of heat, electricity and local fuel wood supply projects; encourage fuel wood use; and, enhance knowledge and management practices to sustainably harvest and burn wood.

The NWT can be a leader in sustainable biomass energy use in Canada. The benefits are significant and can be realized in relatively short time periods. The sustainable and wise development of forest resources can reduce fossil fuel use, save money on imported fossil fuels and reduce greenhouse gas emissions.

Actions contained in The Biomass Energy Strategy fall under four broad objectives:

- Increasing education and awareness of biomass as a heating option for residents and businesses;
- Promoting biomass heating options;
- Promoting greater stability in the supply of biomass in the NWT, including locally produced biomass; and
- Promoting combined heat and power technologies.

Why Biomass?

Environmentally Friendly.
Biomass is a carbon neutral energy source.

Energy Self Sufficiency.
Sufficient biomass resources exist to help reduce dependence on imported fuels.

Economic Development.
Biomass projects can provide long-term jobs in NWT communities.

Energy Savings.
Biomass can reduce the costs of heat and electricity in the NWT.

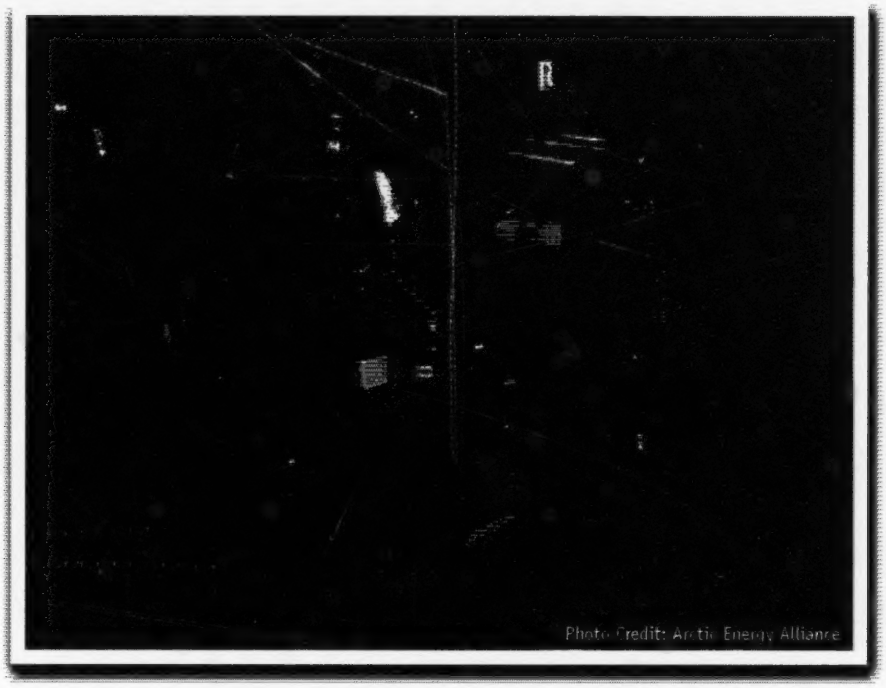


Photo Credit: Arctic Energy Alliance

Increasing education and awareness of biomass as a heating option for residents and businesses

Action 1:

Deliver "Burn-it-Smart" workshops in interested communities starting with three communities in 2009 and 2010.

In 2007 and 2008 ENR funded a "Burn-it-Smart" workshop in Whati. The workshop encouraged the use of proper burning techniques of well-seasoned wood. The Arctic Energy Alliance (AEA) is sponsoring workshops in other NWT communities.

Over the next three years, AEA will deliver "Burn-it-Smart" workshops in all NWT communities that use firewood. AEA and ENR will continue to work to inform and train the public in best practices related to firewood burning.

Action 2:

Promote the use of wood pellet stoves, furnaces and boilers throughout the NWT.

AEA held well-attended wood pellet fairs in Yellowknife in 2008 and 2009. The fair promoted wood pellets for residential use by displaying pellet burning appliances and industry information on related services. Information products on wood pellet consumption were also distributed to the public.

AEA will continue to promote wood pellet appliances throughout the NWT. A wood pellet fair will be held annually in Yellowknife and wood pellets will be promoted at regional trade shows.

Burn-it-Smart Workshop

Burn-it-Smart is a trademark of Natural Resources Canada. The workshops are designed to help people promote safer, more efficient and healthier use of wood as a residential fuel for heating and enjoyment.

Action Plan

Action 3:

Sponsor woodstove and pellet stove installation training.

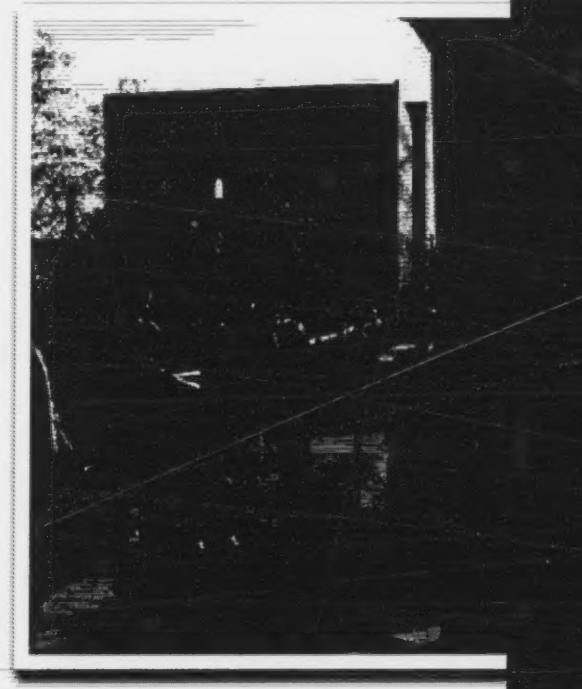
Woodstove and pellet stove installations are scrutinized by insurance companies and regulators for safety concerns. AEA sponsors the industry standard Wood Energy Technical Training (WETT) Program. This ensures the NWT has certified installers to meet the requirements of insurance companies.

Action 4:

Develop air quality guidelines for biomass burning in the NWT to address local air quality concerns at the municipal level.

Modern woodstoves and pellet appliances are more efficient than traditional woodstoves because a greater percentage of the wood is consumed during the burning process. Older woodstoves release smoke composed, in part, of particles which are essentially unburned wood and gaseous by-products. Enhanced designs in modern appliances promote secondary combustion and burn-off these particles and gases, resulting in a more efficient burn and ultimately, cleaner emissions.

The United States Environmental Protection Agency (US EPA) set standards for particulate emissions from woodstoves and pellet appliances (1990), which the Canadian Standards Association (CSA) mirrored under standard CSA B415. Woodstove manufacturers in the USA have been required to comply with the EPA standards and stack test their products prior to selling them to consumers; in Canada, products are available that comply with CSA B415. These emission standards are already being applied to new boilers that receive funding from the GNWT including appliances for home use eligible for rebates from the Energy Efficiency Incentive Program (EEIP).



Wood Energy Technical Training (WETT) Certification

WETT is a program for people who install and maintain wood heat appliances for the public. It is a standard developed by industry and accepted by insurance companies. The courses are delivered by the industry association.

ENR established ambient air quality standards (2002) for a variety of parameters, including particulate matter, and operates air quality monitoring stations in Fort Liard, Yellowknife, Norman Wells and Inuvik. Although woodstove smoke is known to contribute to levels of particulate matter in the air, the highest levels are typically caused by forest fires. As older, less efficient woodstoves and oil burning furnaces are replaced, air quality in communities is expected to improve even if the amount of wood burned increases.

ENR will develop an air quality guideline to ensure that standards and practices are in place to protect local air quality.

Photo Credit: Arctic Energy Alliance

Promoting biomass heating options

Action 5:

Promote efficient biomass burning technologies for residential use through the Energy Efficiency Incentive Program (EEIP).

Biomass is a common fuel source in the NWT due to its relatively low cost and accessibility to residents. The use of firewood and pellets for home heating has been increasing in part because of government rebate programs and awareness campaigns.

The GNWT's Energy Efficiency Incentive Program (EEIP) provides rebates on the purchase of efficient woodstoves and pellet stoves. More than 200 NWT residents have received rebates on new purchases of wood and pellet stoves in the past two years. The GNWT increased rebate amounts in 2008 and 2009 on woodstoves and pellet stoves and created new rebate categories for pellet furnaces and boilers. ENR has also coordinated a marketing plan for EEIP, which highlights the benefits of woodstoves and pellet stoves. AEA delivers this program on behalf of the GNWT.

Action Plan

Action 6:

Continue to expand implementation of biomass systems in GNWT facilities and further solidify the market for biomass fuels.

The GNWT Department of Public Works and Services (PWS) installed wood pellet boilers at the North Slave Correctional Facility in 2006. Based on the favourable performance of those boilers, PWS is installing or planning to install pellet-fired boilers in Yellowknife, Hay River, Fort Smith and Behchokǫ̀. This reinforces the supply by continually expanding the market and giving private industry the security to invest in this growing market.

Photo Credit: David Johnson

Action 7:

Work with communities to assess the potential of establishing and/or expanding new district heat systems using biomass energy as the heating source.

District heat systems supply heat from a central heat plant to more than one building. There are currently several small district heating systems in the NWT. Most have been installed to use residual heat from diesel fired generators operated by the Northwest Territories Power Corporation (NTPC). These systems provide roughly 70 per cent of the total heat load required to heat the connected buildings and may offer opportunities to make up the difference using biomass boilers.

PWS is finalizing plans to construct a small biomass-fired district heat system connecting four schools in Hay River. Adding biomass boilers to existing district heat systems is also being considered, such as the one in Fort McPherson that uses residual heat from the power plant. GNWT departments and AEA will investigate potential opportunities and work with communities to identify candidate sites to install more biomass-fired district heat systems by 2011.

Promoting greater stability in the market and supply of biomass in the NWT, including locally produced biomass

Action 8:

Encourage a stable and economic supply of pellets in all NWT communities.

Wood pellet transportation and storage infrastructure is provided by the private sector and is focused on large communities on the road system. There is potential for expanding wood pellet use and supply in the NWT once economic and technical barriers are addressed.

NWT communities have different infrastructure and transportation supply methods. AEA has completed a *NWT Community Wood Pellet Study* exploring options and costs of delivering pellets to all NWT communities. The Study identified the advantages and barriers related to wood pellet transportation in the NWT. The Study also compared the price to current diesel prices in each community.

To date, most of the pellets consumed in the NWT are purchased from one mill located in northern Alberta because it provides the lowest transportation costs. This means the NWT could be vulnerable to supply interruptions in future years.

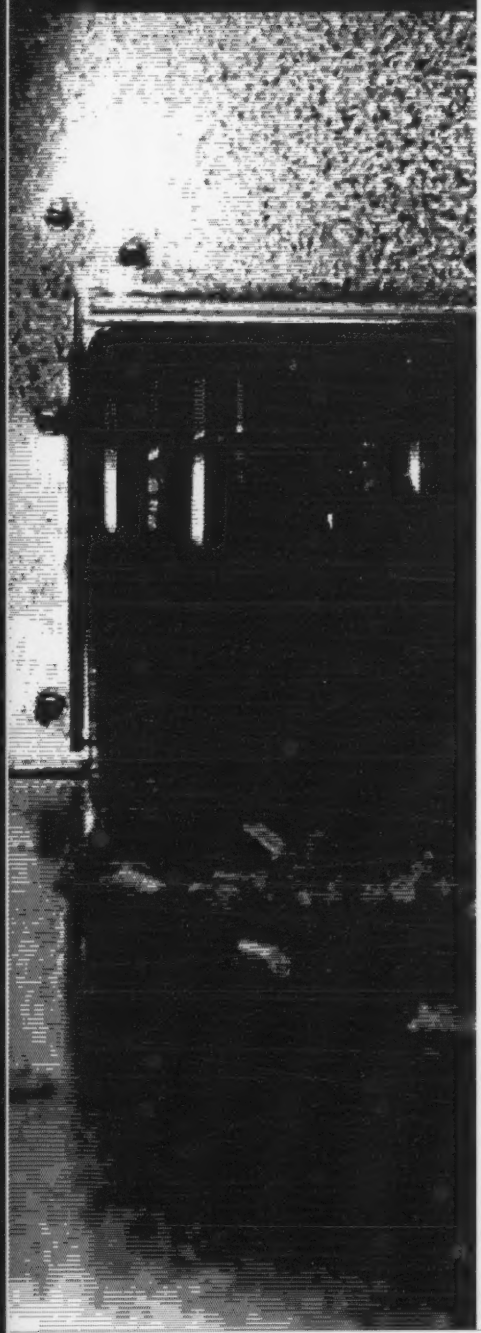
ENR will continue working with AEA and other GNWT departments to establish markets and remove barriers to encourage a dependable and economic supply of pellets in all communities.

Action 9:

Work with the private sector and Aboriginal development corporations to identify viable business models to produce pellets and/or woodchips in the NWT.

There is considerable potential to use NWT forest resources to create biomass energy. The NWT forest industry is not large enough to produce sufficient waste by-product to serve a biomass/pellet production facility. Developing NWT biomass as a fuel source will require harvesting trees for a feed stock.

Action Plan



Large biomass boilers can be fed with either pellets or woodchips. Woodchips can be made from a variety of wood materials including willow, poplar and cuttings from the clearing of road right-of-ways, seismic lines or forest thinning for community protection. They are much easier and cheaper to produce than pellets, but must be used close to where they are produced because they are bulky and expensive to transport.

Recently ENR completed a study entitled *Assessing the NWT Energy Opportunity for Woody Biomass*. This report indicates that a small scale production plant located in the NWT has the potential to produce pellets at a cost that is competitive with pellets purchased from outside of the Territory. Additional work is being done to prepare a detailed feasibility study. The intention is to assist private business establish production capacity during the next two years.

Developing a local supply of pellets or woodchips is an important element of the Biomass Energy Strategy. Local production can provide greater economic and employment benefits and assure consumers that a steady NWT-based supply will continue to be available at predictable prices.

Action 10:

Develop a wood marshalling yard model.

ENR is developing a Wood Marshalling Yard Model with the intention of working with interested communities to establish their own marshalling yard over the course of the next two years.

A wood marshalling yard is a market that buys wood from various wood harvesters and distributes it to a broader market; capitalizing on its increased wood supply ability. In some communities, this may simply be an opportunity to develop a local supply of cured fire wood. Other communities may have broader commercial interests in producing sawlogs, wood for pellet production, or woodchips for local consumption.

A marshalling yard can provide a stable year-round market for harvesters, a supply of timber for consumers who require higher volumes of wood, and encourage local employment. A marshalling yard can potentially accept green wood and cure it before sale.

Action 11:

Evaluate and quantify wood resources around select communities and determine potential harvesting areas.

Most communities are already using wood as a supplemental heating source. ENR is working with interested communities to identify appropriate forest resources to meet local needs for firewood and to evaluate the potential for other types of biomass products.

Different types of forest assessments are being conducted to identify potential sustainable harvests of sawlogs and wood for pellet and/or chip production. Forest inventory information is being improved using satellite imagery, aerial photography and field assessments. Forest growth, productivity and regeneration are being modeled to determine the best areas to focus on for sustainable biomass potential.

Active work is being carried out near the communities of Kakisa, Fort Providence, Jean Marie River, Behchoko, Fort Simpson, Wrigley and Yellowknife. This work will better define the forest resources. Fort McPherson has also expressed interest in harvesting willows for energy; ENR is working with them to advance this potential. New resource inventories and information will be developed as community interest in pursuing new opportunities increases.

Promoting combined heat and power technologies where applicable

Action 12:

Install a combined heat and power pilot project in one community by 2012.

Electricity production from biomass is a new, but relatively well established technology in other parts of Canada and the world. The majority of these are combined heat and power projects, and are at too large a scale for NWT communities. Smaller, more appropriate units are now becoming available.

Electricity production can run off the hot exhaust gases from biomass boilers servicing a heat load. Communities installing district heat systems over the next two years will be assessed for the potential of establishing a pilot project to generate electricity and supplement the community load. Pilot projects will lead to a greater understanding of the potential benefits and limitations associated with biomass generated electricity in communities.

Photo Credit: Arctic Energy Alliance

Community Engagement

ENR will work directly with communities, businesses, residents and other interested parties to assess feasibility, and implement appropriate actions in each community.

Strategy Review

A review of the Biomass Energy Strategy and its implementation will be done in fall 2011. Revisions will be made to reflect the experience and knowledge gained through implementation of actions.

Appendix 1 Summary of Actions

Number	Action
1	Deliver "Burn-it-Smart" workshops in interested communities starting with three communities in 2009 and 2010.
2	Promote the use of wood pellet stoves, furnaces and boilers throughout the NWT.
3	Sponsor woodstove and pellet stove installation training.
4	Develop air quality guidelines for biomass burning in the NWT that can be implemented to address local air quality concerns at the municipal level.
5	Promote efficient biomass burning technologies for residential use through the Energy Efficiency Incentive Program (EEIP).
6	Continue to expand implementation of biomass systems in GNWT facilities and further solidify the market for biomass fuels.
7	Work with communities to assess the potential of expanding or establishing new district heat systems using biomass energy as the heating source.
8	Encourage a stable and economic supply of pellets in all NWT communities.
9	Work with the private sector and Aboriginal development corporations to identify viable business models to produce pellets or woodchips in the NWT.
10	Develop a wood marshalling yard model.
11	Evaluate and quantify wood resources around select communities and determine potential harvesting areas.
12	Install a combined heat and power pilot project in one community by 2012.

January 2010